WHAT IS CLAIMED IS:

1. A thermally conductive material for removing the heat dissipated by an integrated circuit, the thermally conductive material comprising a diamondoid.

2. The thermally conductive material of claim 1, wherein the diamondoid comprises a diamondoid-containing material.

3. The thermally conductive material of claim 1, wherein the diamondoid comprises a derivatized diamondoid.

4. The thermally conductive material of claim 1, wherein the diamondoid comprises an underivatized diamondoid.

5. The thermally conductive material of claim 1, wherein the diamondoid is a lower diamondoid.

6. The thermally conductive material of claim 1, wherein the diamondoid is a higher diamondoid.

7. The thermally conductive material of claim 6, wherein the diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.

8. The thermally conductive material of claim 1, wherein the material is a film.

9. The thermally conductive material of claim 1, wherein the material is a fiber.

10. The thermally conductive material of claim 2, wherein the diamondoid-containing material is selected from the group consisting of a diamondoid-containing polymer, a diamondoid-containing sintered ceramic, a diamondoid ceramic composite, a CVD diamondoid film, and a self-assembled diamondoid film.

11. The thermally conductive material of claim 10, wherein the diamondoid content of the thermally conductive material ranges from about 1 to 100 percent by weight for the diamondoid-containing polymer, about 1 to 99.9 percent by weight for the diamondoid-containing sintered ceramic, about 1 to 100 percent by weight for the CVD diamondoid film, and about 1 to 99.99 percent by weight for the self-assembled diamondoid film.

12. The thermally conductive material of claim 1, wherein the thermal conductivity of the material is at least 200 W/m K.

13. The thermally conductive material of claim 1, wherein the thermal conductivity of the material is at least 500 W/m K.

14. The thermally conductive material of claim 1, wherein the thermal conductivity of the material is at least 1,000 W/m K.

15. A low-k material for electrically isolating the interconnection lines and vias of an integrated circuit, the low-k material comprising a diamondoid.

16. The low-k material of claim 15, wherein the diamondoid comprises a diamondoid-containing material.

17. The low-k material of claim 15, wherein the diamondoid comprises a derivatized diamondoid.

18. The low-k material of claim 15, wherein the diamondoid comprises an underivatized diamondoid.

19. The low-k material of claim 15, wherein the diamondoid is a lower diamondoid.

20. The low-k material of claim 15, wherein the diamondoid is a higher diamondoid.

21. The low-k material of claim 20, wherein the diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.

22. The low-k material of claim 15, wherein the material is a film.

23. The low-k material of claim 15, wherein the material is a fiber.

24. The low-k material of claim 16, wherein the diamondoid-containing material is selected from the group consisting of a diamondoid-containing polymer, a diamondoid-containing sintered ceramic, a diamondoid ceramic composite, a CVD diamondoid film, and a self-assembled diamondoid film.

25. The low-k material of claim 24, wherein the diamondoid content of the low-k material ranges from about 1 to 100 percent by weight for the diamondoid-containing polymer, about 1 to 99.9 percent by weight for the diamondoid-containing sintered ceramic, about 1 to 100 percent by weight for the CVD diamondoid film, and about 1 to 99.99 percent by weight for the self-assembled diamondoid film.

26. The low-k material of claim 15, wherein the dielectric constant of the material is less than about 4.

27. The low-k material of claim 15, wherein the dielectric constant of the material is less than about 3.

28. The low-k material of claim 15, wherein the dielectric constant of the material is is less than about 2.

29. A field emission device having a cathode, wherein the cathode comprises a diamondoid.

30. The field emission device of claim 29, wherein the diamondoid comprises a diamondoid-containing material.

31. The field emission device of claim 29, wherein the diamondoid comprises a derivatized diamondoid.

32. The field emission device of claim 29, wherein the diamondoid comprises an underivatized diamondoid.

33. The field emission device of claim 29, wherein the diamondoid is a lower diamondoid.

34. The field emission device of claim 29, wherein the diamondoid is a higher diamondoid.

35. The field emission device of claim 34, wherein the diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.

36. The field emission device of claim 29, wherein the material is a film.

37. The field emission device of claim 29, wherein the material is a fiber.

38. The field emission device of claim 30, wherein the diamondoid-containing material is selected from the group consisting of a diamondoid-containing polymer, a diamondoid-containing sintered ceramic, a diamondoid ceramic composite, a CVD diamondoid film, and a self-assembled diamondoid film.

39. The field emission device of claim 29, wherein the diamondoid content of the cathode ranges from about 1 to 100 percent by weight for the diamondoid-containing polymer, about 1 to 99.9 percent by weight for the diamondoid-containing sintered ceramic, about 1 to 100 percent by weight for the CVD diamondoid film, and about 1 to 99.99 percent by weight for the self-assembled diamondoid film.

40. The field emission device of any of claims 29 through 39, wherein the electron affinity of the cathode is negative.

41. The field emission device of any of claims 29 through 39, wherein the electron affinity of the cathode is less than about 3.0 eV.

42. The field emission device of any of claims 29 through 39, further including an anode positioned adjacent to the cathode, and a power supply for supplying a potential difference between the anode and the cathode.

43. The field emission device of any of claims 29 through 39, where the potential difference that is applied between the anode and the cathode is less than about 10 volts.

44. The field emission device of any of claims 29 through 39, wherein the diamondoid surface surface comprises carbon atoms that are substantially sp^3-hybridized.

45. The field emission device of any of claims 29 through 39, wherein the diamondoid surface is derivatized such that the surface comprises both sp^2 and sp^3-hybridization.

46. A capacitor having a dielectric layer positioned between a first electrode and a second electrode, wherein the dielectric layer comprises a diamondoid-containing material.

47. The capacitor of claim 46, wherein the diamondoid comprises a derivatized diamondoid.

48. The capacitor of claim 46, wherein the diamondoid comprises an underivatized diamondoid.

49. The capacitor of claim 46, wherein the diamondoid is a lower diamondoid.

50. The capacitor of claim 46, wherein the diamondoid is a higher diamondoid.

51. The capacitor of claim 50, wherein the diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.

52. An integrated circuit device passivated by a diamondoid-containing material.

53. The integrated circuit device of claim 52, wherein the diamondoid comprises a derivatized diamondoid.

54. The integrated circuit device of claim 52, wherein the diamondoid comprises an underivatized diamondoid.

55. The integrated circuit device of claim 52, wherein the diamondoid is a lower diamondoid.

56. The integrated circuit device of claim 52, wherein the diamondoid is a higher diamondoid.

57. The integrated circuit device of claim 56, wherein the diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.

58. A method of nucleating the growth of a diamond film, wherein the film is nucleated with triamantane.

Sub B_2 > 59. A method of nucleating the growth of a diamond film, wherein the film is nucleated with a diamondoid selected from the group consisting of a lower diamondoid, a higher diamondoid, and a mixture of a lower and a higher diamondoid.

60. The method of claim 59, wherein the higher diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.

Add B_3 > add C47